Mathemat: vol 6.

6d.

THE
Meaſurer and *Gauger's*
GUIDE.

CONTAINING

First, The Reaſons of the Five Principal Rules of *Arithmetick*, Demonſtrated by Lines; with Examples of each Rule.

Secondly, Meaſuring of *Surfaces* and *Solids*, ſuch as Plank, Timber, Stone, &c. *Joiners*, *Carpenters*, *Bricklayers*, *Glaſiers*, *Painters and Paviours* Work: Each Propoſition being wrought *Vulgarly*, *Decimally*, *Practically* and *Inſtrumentally*.

A Small Tract of
GAUGING
Wine, Ale or Malt
Without INCHES
Or DIVISION.

By which any one may *Gauge* Ten Backs, or Floors of *Malt*, in the ſame time another ſhall *Gauge* One, by the way now uſed: Altogether New, and ſubmitted to the *Cenſure* of the *Commiſſioners* of *Exciſe*.

By *J. L.* P. M.

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20. Octob. 1709

G.R. III.
BR. MUS.

TO HIS
Worthy and *Ingenious* Friend,
Mr. *John Williams*,
THIS SMALL
Mathematical Treatiſe
Is Humbly Preſented,
In Grateful Acknowledgment
Of his Many and Singular
FAVOURS,
And humbly Submitted
TO HIS
Judicious *Candor* and *Protection*.

BY

His moſt Devoted
Humble Servant,

J. Lightbody.

THE
Meaſurer and *Gauger's*
GUIDE
TO
The Theory and Practice
# of MEASURING.

The Reaſons of the five Principal Rules of Arithmetick, *with Examples of each Rule.*

Of NUMERATION.

NUMBERS may be conſider'd in a two-fold Capacity; *the Thing numbred,* and *the Number of the Thing.*

Thus, the Number 9 ſignifies 9 *Some-things*; as the 9 Muſes, or 9 Men, or 9 Pounds, &c. So that they may properly be term'd *Numerator* and

Denominator in whole Numbers, as well as in Fracti-ons; for they may be expreſt thus,

$$\frac{[9]}{[\text{Men}]}\quad\begin{matrix}\textit{Numerator.}\\ \textit{Denominator.}\end{matrix}$$

For Numeration is a true Diſtinction, Eſtimation and Pronounciation of Things or Numbers, or a Rule to read any Nnmber by.

The *Arabians* are ſuppoſed to be the firſt Inventers of the 9 Digits, or Characters of Numbers now generally uſed, and diſpoſed them after the ſame manner we now do.

The Reaſon of the Infinite Increaſe of Numbers, from 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, (the Ten Characters from which all Numbers are produced) is this; 1 and a Cypher is called Ten, becauſe it is 9 more 1, or 1 added to nine, expreſt 10. Then one repeated thus, 11 is called Eleven, or ten more 1: And ſo 10 more 2 is 12, and ſo on.

If you were to Inſcribe the Numerical Character in the Cypher, as in the following Line, it would be the ſame thing.

Suppoſe theſe Parentheſes to be ○

1(1) 1(2) 1(3) 1(4) 1(5) 1(6) 1(7) 1(8) 1(9)

So that if the Cyphers be taken away, and a Figure ſtand in its Place, it expreſſes the ſame.

When you have added every one of the Digits ſeverally to 1, the laſt will be 19. Then begin at the ſecond place 2, and add a Cypher to it, and it ſignifies two tens, or twenty; and one added to that, makes 21, and ſo on to 9, and then begin again at 3, and add every one of the Digits to it, until you have in the ſame manner gone through the 9 Digits, and the laſt will be 90.

Then begin at 1, and add 2 Cyphers to it, as 100, and that ſignifies a hundred, or ten times ten, and ſo on till you come at nine as before, and by this means Numbers become endleſs, by ending always at ſucceſſively, and beginning again at 1.

The TABLE *of Numeration.*

1 2 3 4 5 6 7 8 9	Hundreds of Millions, or 123 Mill. 456 Th. 789.
2 3 4 5 6 7 8 9	Tens of Millions, or 23 Millions 567 Thouſ. 789.
3 4 5 6 7 8 9	Millions, or 3 Millions, 456 Thouſand 789.
4 5 6 7 8 9	Hundreds of Thouſands, or 456 Thouſand 789.
5 6 7 8 9	Tens of Thouſands, or 56 Thouſand 789.
6 7 8 9	Thouſands, or 6 Thouſands 789.
7 8 9	Hundreds, or 7 Hundred and 89.
8 9	Tens, or 89, or 8 Tens and 9 Ones.
9	Units, or 9 Ones.

A TABLE *of Old* Roman *Numbers.*

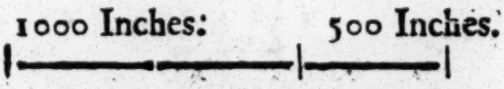
100	C.	2000	CIↃ. CIↃ. *or* M.M.
200	CC.	3000	CIↃ. CIↃ. CIↃ. *or* M.M.M.
300	CCC.	5000	IↃↃ.
400	CCCC.	10000	CCIↃↃ.
500	D. *or* IↃ.	50000	IↃↃↃ.
600	DC.	100000	CCCIↃↃↃ. *or* CM.
700	DCC.	500000	IↃↃↃↃ.
800	DCCC.	1000000	CCCCIↃↃↃↃ.
900	DCCCC.	1702	MDCCII.
1000	M. *or* CIↃ.	1709	CIↃ. IↃCCIX.

Of ADDITION.

ADDITION is the adding of Numbers of the ſame kind together, to make a Total, ſuch as a Sum or Sums of Money; a Number of Inches, Feet, Yards, Sheep, Oxen, *&c.* and this may be called *proper Addition*, becauſe the Sum is of the ſame kind as the Parts. But the adding together things of different Kinds, ſuch as 105 Sheep to 15 Oxen, produces a Number it's true, but the Number is compoſed of mixt Things, and therefore may be called *Improper Addition.*

REASON.

As Numbers are Infinite, ſo a Line may be ſaid to be Infinite, So that ſuppoſe a Line to be 1000 Inches long, that Line is capable of being made longer, by adding another Line to the end of it: So is Money to be made more, by the ſame Rule.



Now the Line given was 1000 Inches, but the 500 being added to it, makes it 1500, which is the ſame as if you would add to 1000 Shillings 500 Shillings, the Sum would be

1000 Shill.
500 Shill.

1500

So that adding Money to Money is the ſame thing as adding a Line or Lines to a Line.

Example.

Example of Addition.

Place all Numbers of the ſame Kind under one another, and carry the *Tens* to the next Figure to the left Hand. Example,

To	2725	To	72575	To	2753
Ad	172	Ad	1723	Ad	15
Sum	2897	Sum	74298	Sum	2768

Addition of Mony.

For every 4*f.* 12*d.* and 20*s.* carry one to the Left Hand.

Example.

To	7	15	3¼	To	123	17	1½
Ad	2	12	9½	Add	22	12	3¾
	10	08	0¾		146	09	5¼

Of SUBTRACTION.

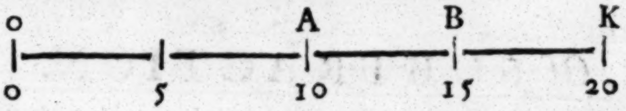
S*Ubtraction* is the Reverſe of *Addition*, by taking a leſſer Number from a greater, provided they be both of one Kind or Denomination ; for if you ſhou'd pretend to ſubtract 20 *Horſe* from 100 *Hogs*, it would be very abſurd. It's true, you may take 20 of one thing from 100 mixt things, and then there will remain 80 Things. But this is neither reaſonable nor practicable.

REASON.

The taking a Sum of Mony from a Sum of Money, is taking of part from the whole; for we compare *Money* to a *Line*, which is capable of being made longer or ſhorter at Pleaſure: Now all the Mony in the World is but a Sum of Mony, and any part of it is a Sum, and from that Part (unleſs it be the ſmalleſt Part) you may take a Sum. So a Line of 1000 Inches long, is but a Line; and any part of that Line, let it be ever ſo ſhort, is ſtill a Line.

Suppoſe a Line to be 20 Foot long, and I would have the Half, and the Quarter taken from it; by this Means, I have taken three Quarters from it, ſo that there will be but a Quarter remaining.

For if you take o.A from o.C, then A.C. will remain; then, if you take A.B from A.C, there will remain B.C: Or, if you take any part of the Line, from any part of the Line, a Part of that Part will remain. If from o.10, you take o.5, there will remain 5.10; ſo that you may ſubtract Part from Part, until you have broke the whole Line into an infinite Number of minute Fractions.



Now we are to conſider *Mony*, as a Sum made up of an infinite Number of the ſmalleſt Parts, as ſuppoſe *Farthings*: And when we come to ſubtract *Mony* from *Mony*, *Weight* from *Weight*, *Meaſure* from *Meaſure*, and the like, we muſt conſider how many of the ſmalleſt Parts make the next immediate Part. As for Example: In *Engliſh Mony*, we account *Farthings*, *Pence*, *Shillings*, *Pounds*; which we call, in the Art of Numbring, *Fours*, *Twelves* and *Twenties*, becauſe there are 4 *Farthings* in a *Penny*, 12 *Pence* in a *Shilling*, and 20 *Shillings* in a *Pound*.

For that reaſon we borrow 4, 12, 20, and 10 in *Subtraction.* But it is ſomewhat odd, that when we borrow in one Line, we pay it in the other; as in this Example.

	l.	*s.*	*d.*
From	15	16	09
Take	07	18	10
Reſts	7	17	11

Here take 10 from 9, which is not to be done, therefore we borrow 12, which is the next Superiour Denomination, and add to the 9, and it makes 21; now take 10 from 21, and there will remain 11. Then I ſay, 18 and 1 which I borrow'd is 19; 19 from 16 I cannot, ſo that I muſt borrow 20, which is the next Superiour Denomination, and that makes 36. and when I have taken 19 from 36, there will remain 17. Then 7, and 1 which I borrow'd, is 8, from 15 and there will remain 7.

The paying what you borrow'd from the firſt Line, to the ſecond, is the ſame thing as if you would make the next immediate Number from which you borrow'd the one, that one leſs, and ſubtract from it the Number beneath it, without adding any thing to it. Example,

	l.	*s.*	*d.*
From	15	16	09
Take	7	18	10
Reſts	7	17	11

I take 10 from 21, which is 12 added to 9, and there will remain 11; then I ſay 18 (without adding the 1 which I borrow'd to the 18) from 35, which is 20 added to 16 leſs one, and there will remain 17. Then take 7 from 14, for I borrow'd one from 15, ſo that there can remain but 14, and there remains 7; for ſurely when you borrow one from any Number, that Number muſt be one leſs.

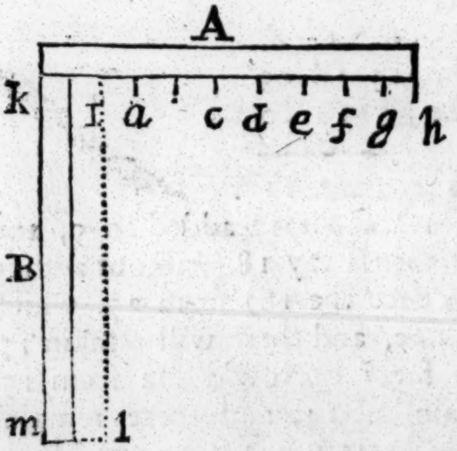
Multipli-

Of MULTIPLICATION.

M*Ultiplication* is a conciſe way of *Addition*, for 5 repeated five times, makes 25, and ſo doth 5 multiply'd by 5. Or it is the augmenting of any thing, to make it what Number, or Quantity of Parts you pleaſe, larger than it is. For if I were to make any thing thrice as big as it is, I muſt add two things of the ſame kind to that thing, which is the ſame as if you had multiply'd it by three.

REASON.

Suppoſe 2 Planks, 10 Foot long each, and 1 Foot broad; now if you lay one of thoſe Planks by the other, they will make 20 Superficial Feet; or if you lay them at the end of each other, they will make the ſame Dimenſion, as to Superficial Meaſure; but If you were to run one Plank along by the ſide of the other, as in the following Demonſtration, it would make 100 Feet in ſuperficial Spaces.



If you move B to I, it will make a Surface of *k*, I, *l*, equal to 20 Foot; then remove it to *a*, and it will make 30, and to *b* 40. So that when you remove it to *h*, it will make 100 ſuperficial Feet.

For the flowing of one Line along another, produces a Surface equal to ſo many ſquare Quantities as there are equal Quantities in the Line which flows along the other. Suppoſe a Line to be 20 Foot long, and another 10 Foot long, that Line of 10 Foot being run along the Line of 20, until it comes to the End, produces a Surface of 200 Foot.

Multiplication TABLE.

1	2							
2	4	3						
3	6	9	4					
4	8	12	16	5				
5	10	15	20	25	6			
6	12	18	24	30	36	7		
7	14	21	28	35	42	49	8	
8	16	24	32	40	48	56	64	9
9	18	27	36	45	54	63	72	81

Obſerve in *Multiplication* to ſet *Units* under *Units*, *Tens* under *Tens*, and *Hundreds* under *Hundreds*, ſo that you are to place your *Multiplier* as far to the Right-hand, as there are any Figures in the *Multiplicand*.

Multiply each Figure in the *Multiplicand*, by each Figure in the *Multiplier*; and obſerve to ſet the firſt Figure of each reſpective *Product* under the Figure of the *Multiplier*, by which it was made; add the ſeveral *Products* together. *Example*,

Multiply	123	or	*Multiplicand*	2753
By	23		*Multiplier*	27
	369			19271
	246			5506
Product	2829		*Product*	74331

As in the firſt of the foregoing Examples, 3 times 3 is 9; 3 times 2 is 6; 3 times one is 3, which makes 369 the *Product* of the laſt of the Figures of the *Multiplier* being multiply'd into the *Multiplicand.*

Then twice 3 is 6; twice 2 is 4; and twice 1 is 2, which makes 246 plac'd one place ſhort of *Unity.*

Make a Sum of the two *Products*, and it makes 2829, but in the ſecond Example you are to carry your *Tens* to the Left-hand, adding them to the next Figure to be multiply'd.

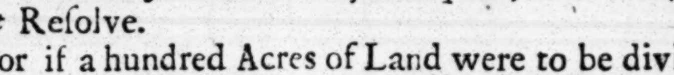
Of DIVISION.

D*Iviſion* is the breaking of a Number, or Thing, into what Number of Parts one pleaſes, and the *Quotient* will be one of the Parts requir'd; ſo that the *Diviſor* doth always Require, and the *Quotient* Reſolve.

For if a hundred Acres of Land were to be divided amongſt 3 Men, the 100 being divided by 3, gives each Man's Share, and the *Quotient* is one of the Parts, or Shares; ſo that the *Quotient* is only a piece broke off the whole, or a Fraction of the whole, produced by asking how often the *Diviſor* is contain'd in the *Dividend.*

REASON.

Suppoſe a Line of 500 Yards long, part whereof is to be divided unequally amongſt 3 Men; ſo as A muſt have one third Part, and B a Quarter, and C one Eighth of the whole Line.



Divide the whole Length of the Line by 3, and the

Quotient A C is the firſt Man A's Share: Then divide the whole Line by 4, and the *Quotient* is B's Share, or D B; then divide by 8, and the *Quotient* is E B, or C's Share; ſo that you have divided the Line into $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, and there remains $\frac{1}{8}$ and $\frac{1}{3}$ of an Eighth, which is that part of the Line between C and D.

An Example of *Diviſion.*

Diviſor) *Dividend* (*Quotient*
25) 75326 (3013
75...
———
0032
25
———
076
75
———
01

The manner of working is, how often can I have 25 in 75, I can have it thrice, therefore ſet three in the *Quotient*, and multiply the *Diviſor* by that three, and ſet under 75 in the *Dividend*, ſaying 3 times 5 is 15, ſet 5 under 5 and carry one, then thrice 2 is 6, and one is 7, which ſet under ſeven, then draw a Line and ſubtract 75 from 75, and there will remain none; then prick under the next Figure in the *Dividend*, and bring it down, and ſet to the *Remainder*, and the Work will ſtand thus

25) 75326 (3
75.
———
003

Then, how often can I have 25 in the *Remainder* 3; no times, therefore I ſet a *Cypher* in the *Quotient*, and bring down the next Figure in the *Dividend*, and ſet to the Right-hand of 3, and the *Remainder* will be 32; then demand how often you can have 25 in 32, and you find it once, which ſet in the *Quotient*, and the Work will ſtand thus.

```
25) 75326 (301
    75··
    ----
    0032
```

Multiply the *Diviſor* by the laſt Figure in the *Quotient* as before, ſaying once 5 is 5, and once 2 is 2, and ſet under 32, ſubtract the one from the other, and the *Remainder* will be 07, as you may ſee by the Work.

```
25) 75326 (301
    75··
    ----
    0032
      25
      --
      07
```

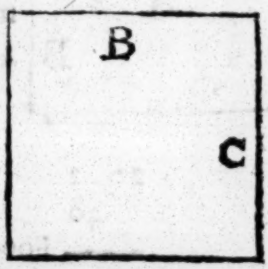
Then demand how often the *Diviſor* in the *Dividend*, which is found thrice, which ſet down in the *Quotient*, and work as before, and you have compleated the Work.

```
25) 75326 (3013
    75··
    ----
    0032
      25
      ---
      076
       75
       --
       01
```

THE
Theory and Practice
OF
MEASURING,
Both by the *Pen* and *Gunter's Line.*

Of Surfaces, or Superficial Meaſure.

A SQUARE.



LET the Side of a *Square* be B or C, = 7 Inches each; multiply B by C, and divide by 144, and the *Quotient* is 34 Feet.

Vulgarly.

B=70
C=70
———— Foot
144) 4900 (34
580
(4

Example.

Or multiply 5 Foot 10 Inches (for 70 Inches is 5 Foot 10 Inches) by 5 Foot 10 Inches, croſs ways, by ſaying, 5 times 10 Inches is 4 Foot 2 Inches, and 5 times 5 is 25, which makes 29; then take the $\frac{1}{2}$ and the $\frac{1}{3}$ of the firſt Line, as in the Margin, for the 10

Inches in the laſt Line, which was not multiply'd, as follows:

Practically,

5 10 Inch.
5 10 Inch.

---

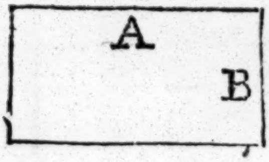
29 2
2 11 = $\frac{1}{2}$
1 11 = $\frac{1}{3}$

---

34 0

By *Gunter*'s Line and Compaſſes, ſet one Point in 1, and extend the other to 5 and $\frac{3}{4}$, on the Line of Numbers; then turn the Compaſſes, the Point ſtanding ſtill in 5$\frac{3}{4}$, and the Point that ſtood in 1, will cut the Rule 34 Foot. Do this for *Squares* only.

An OBLONG.



Let the Side A be 40, B 20.2, A multiply'd by B, and divided by 144, gives 5 Foot 7 Inches.

Example.

20.2
40
Foot
144) 808.0 (5.6
880
(16

Foot Inch.
3 4
1 8

---

3 4
1 8 = $\frac{1}{2}$
7 = $\frac{1}{3}$ of that $\frac{1}{2}$

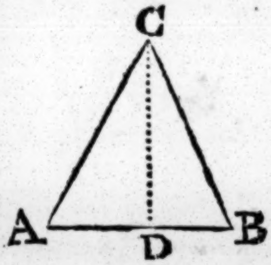
---

5 7

By *Gunter*, ſet one Foot in 1, and extend the other Foot to 1 Foot 8 Inches, or a little leſs than ¾, and then ſet the Point in 3 Foot ½, and the other Point 5 ½ Inches.

A TRIANGLE.

All *Triangles* are meaſur'd by one and the ſame Method, by letting fall a Line from the blunteſt *Angle* to the neareſt Place of the oppoſite Side, and that is call'd the *Perpendicular*. The upright Side of a Right *Angle Triangle*, is the perpendicular.



Let the Side A.B be 42 Inches, and the *Perpendicular* C.D 66: Multiply A.B by ½ C.D, and the *Product* divide by 144.

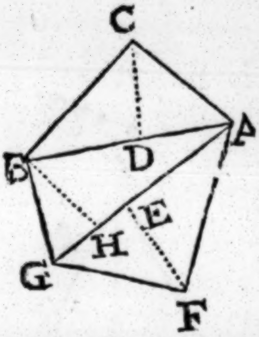
Example.

Vulgarly.	Practically.	Decimally.
42=A.B.	3 6 = A.B.	3.50
33=½ C.D.	2 9= ½ C.D.	2.75
126	7 0	1750
126	1 9= ½ A.B.	2450
	10½=¼A.B.	700
144) 1386 (9.6		
90.0	9 7½	9.625
3 6		

Note, When you work Decimally, 1.5 is = ½ a Foot, .25 to a Quarter, and .75 to 3 Quarters.

By *Gunter*, as 1. is to 3.½, ſo is 2.¾ to 9 Foot 7 ½ Inches.

A TRAPEZIUM.



This *Trapezium* is divided into three *Triangles* by the Lines A.B, and A.G, and the *Perpendiculars* are C.D B.H, and E.F. The ſeveral Contents of thoſe *Triangles* being found in Inches, according to the laſt Paragraph, and added together, divide by 144, and it gives the Content of the *Trapezium*; or if they be found in Feet and Inches, add them together, and the Sum is the Content.

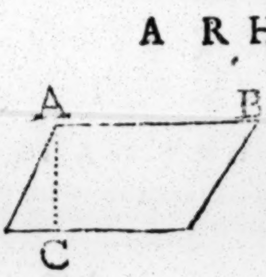
Suppoſe the *Content* in Inches of the *Triangle* A.B.C to be 800 Inches; the *Triangle* A.B.G 634, and A.G.F 824 Inches, the Sum is 225; which divide by 144.

Example.

144) 2258 15.6
818
98.0
126

By *Gunter*, as 1. is to the $\frac{1}{2}$ of C.D, ſo is A.B to the Content of the *Triangle* A.B.C; and ſo work the other two, and make a Sum, and you have the Content of the *Trapezium*.

A RHOMBOIDES.



Let A.B be 640 Inches, or 53 Foot 4 Inches; A.C 200 Inches, or 16 Foot 8 Inches. Multiply A.B by A.C, and divide by 144.

Example.

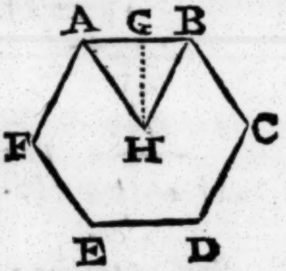
640
200
144) 128000 (888.8
1280
1280
128.0

Feet. *Inch.*
53 4 = A.B
16 8 = A.C
853 4
26 8 = $\frac{1}{2}$ of A.B
8 10 = $\frac{1}{3}$ of the $\frac{1}{2}$ A.B
888 10

By *Gunter*, as 1 is to A,B, ſo is A.C unto the Content $888\frac{3}{4}$.

A POLYGON.

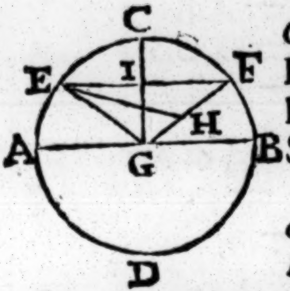
Let A.B, B.C, C.D, E.F, F.A, be the Sides of the *Polygon*, each of them equal to 30 Inches, and perpendicular G.H (being a Line drawn from the Center to the middle of any one of the Sides) equal to 20. Multiply the Sum of all the Sides by $\frac{1}{2}$ of the Perpendicular G.H, and divide by 144; or multiply the Content of the *Triangle* A.B.H by 6, the Number of the Sides, and you have the Content of the *Hexagon*. It needs no Example, becauſe it is wrought as *Triangles*.



Note, To find the *Center* of a *Poligon* of odd Number of Sides, draw a Line from any *Angle* to the Middle of the oppoſite Side, and croſs that with another, and where they croſs is the *Center*. But if of even Sides, draw a Line from any *Angle* to the Oppoſite, and croſs that.

By *Gunter*, as 1 is to $\frac{1}{2}$ G.H, the Perpendicular from the *Center* to the Middle of one Side, ſo is the $\frac{1}{2}$ Sum of all the Sides to the *Content*.

A CIRCLE.



A.B the *Diameter*, A.B.C.D the *Circumference*, E.F the *Chord*, E.C.F.G the *Sector*, E.C.F the *Segment*, F.G or B.G *Cemi Diam.* F. H; a Sine C.I, *ver. Sine.*

Before you can find the Content of a *Circle*, you muſt have both *Diameter* and *Circumference* given.

Let the *Diameter* A.B be 36 Inches; multiply 36 by 3.14, and the *Product* will be 113 Inches = the *Circumference*; multiply $\frac{1}{2}$ the *Circumference* by $\frac{1}{2}$ the *Diameter*, and the *Product* divide by 144, gives the Content in *Feet.*

Example.

```
      56.5 = ½ of 113 A.B.C.D
        18 = ½ of 36 A.B
     ______
      4520
      565
    ______     Feet.  Inch.
244) 1017.0   (7      0
      (90
```

```
4 8 = ½ the Circumf.
1 6 = ½ the Diamet.
_____
4 8
2 4 = ½ the firſt Line
_____
7 0
```

By *Gunter*, as 1 is to $\frac{1}{2}$ the *Circumference*, ſo is $\frac{1}{2}$ the *Diameter* to the *Content.*

A *Sector* of a CIRCLE.

Multiply E.G. by E.C, and the *Product* is the Content.

A *Segment* of a CIRCLE.

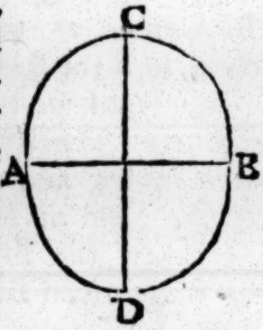
Take the Content of the *Triangle* E.F.G from the Content of the *Sector* E.C.F.G, and the Remainder is the Content of the *Segment* E.C.F.

Or, ſuppoſe the *Segment* alone be requir'd, and you have no Content of the *Sector*, then draw the Line F.H to the middle of E.G. Subtract H.F from E.C.F, and multiply by the ½ of G.F, and you have the Content.

Note, That the *Cord* E.F is always .9 of the *Arc.* E.G.F.

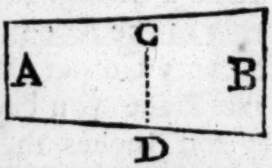
An OVAL.

Let A.B be 48 Inches, and C.D 72; multiply C.D by A.B, and extract the ſquare Root of the *Product*, and that is the mean Diameter of the *Oval*.



The *Root* of 72 multiply'd by 48, is 58; multiply that by 3.14, and that gives 182 = the Circumference of a *Circle*, whoſe Diameter is 58; multiply ½ the Circumference by ½ the Diameter, as you did in a *Circle*, (for now it's reduc'd into a *Circle*) and divide by 144, or 282, or 231, as before, and you have the Content in ſuperficial Feet, or *Area* in Gallons.

Suppoſe A.B a Plank or Board, broader at one End than the other.



Let the End A be 39 Inches, or 3 Foot 3 Inches, and the End B, 30 Inches, or 2 Foot 6, Length, 120 Inches. Multiply A by B, and the Square Root of the *Product* is the mean Bredth at C.D, which is the true Geometrical Mean; but the Practical way, is, to add both Ends together, and take the ½ of the Sum for a Mean. Multiply that Mean into rhe Length, and divide by 144 for the Content.

Example.

39
30
——— *Mean*
1170 (34.2
270
64) 14.00
682) 36

34.2
12.0
———
6840
342
1026
——— *Content*
144) 4104.0 (28.50
1224
720
66

Feet, Inch.
10 00
02 10
———
20 00
05 00
———
03 40
———
28 04
Content.

By *Gunter*, as 1 is to the *Mean* C.D, 2 Foot 10 Inches, ſo is the Length 10 Feet to 28 Feet.

Let a Plank be ever ſo irregular, it may be meaſured pretty exactly, by taking the Breadth of it in 5 or 6 Places, and add the ſeveral Breadths together, and that Sum divide by the Number of Places you have taken the Breadths, (ſuppoſe 6) and the *Quotient* is the mean Breadth.

Inſtructions to Painters *and* Glaziers.

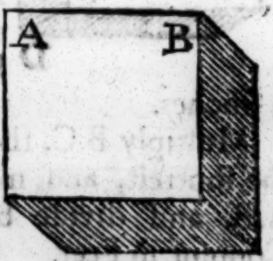
As Rooms are of ſo many various Forms, I ſhall only give a general Rule in all Caſes.

Take a String, and apply one End of it to any one Corner of the Room, then meaſure the Room, going into every Corner, with the String, until you come at the Place you began at; then meaſure how many Feet and Inches the String is, and ſet down; then meaſure the Heighth by the ſame Method, going into every *Angle* of the Molding, and ſet that down under the other; multiply the one by the other, and divide by 9, and the *Quotient* will be the Yards of Painting, or Wainſcot. If there be a Chimney, meaſure the Chimney by the foregoing Rules, according to the Figure of it, and deduct from the whole.

Glaziers are to take the Depth and Breadth, of all Windows that are alike, in Inches, and make a Sum of all the Depths, and likewiſe of all the Breadths, and multiply the one by the other, and divide by 144, and the *Quctient* is Feet; or by the Rule, as 1 is to the Heighth or Depth of the Whole, ſo is the Bredth of the Whole to the Content.

Meaſuring of Solids, *apply'd to* Timber, *and* Liquids, *ſuch as* Beer *and* Wine-Meaſure, *&c.*

A CUBE.



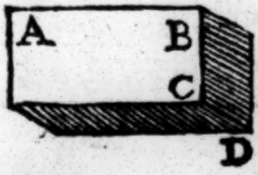
A *Cube* is a Solid whole Lenth, Breadth and Thickneſs are equal, in the Form of a *Dye.*

Let A.B be 39 Inches; multiply A.B by A.B; that is, 39 by 39, and that *Product* by 39, and divide by 1728 for *Timber*, 282 for *Beer*, 231 for *Wine*, and the ſeveral *Quotients* gives you the Feet of *Timber*; or, Gallons of *Beer* or *Wine* that *Cube* would hold, if it were hollow. *Example.*

Vulg.	Pract.	Decim.
39	3 3=A.B	3.25
39	3 3=A.B	3.25
351	9 9	1625
117	10—½	650
		975
1521	10 6 Sum	
39	3 3=AB	10.5625
		3.25
13689	31 6	
4563	2 7½	528125
		211250
1728) 59319 (34.3	34 1½ Sum of	316875
7479		
567.0		34.328125
486		

By *Gunter*, ſet one Foot of the Compaſſes in 1, and extend the other to the Length of the Side in Feet and Parts, *viz.* 3 Foot and $\frac{1}{2}$; then turn your Compaſſes twice at that Extent, and the Point will cut 34 Foot on the Rule, and ſomewhat more.

A PARALLELEPIPEDON.



Let A.B the Length, be 144 Inches, or 12 Foot; and B.C 18 Inches, or one Foot and a half; and Thickneſs or Breadth of one End C.D, 15 Inches, or 1 Foot 3 Inches.

Multiply B.C, the longeſt Side of the End, by C.D the ſhorteſt, and multiply the *Product* by the Length A.B, and divide by 1728, and the *Quotient* is the Content in Feet.

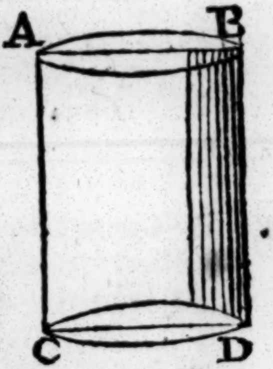
Example.

BC×CD×AB	18	Feet.	Inch.
1728=22 5	15	1	6=B.C
282 for Beer.	———	1	3=C.D
231 for Wine.	90	———	
	18	1	6
	———	0	$4\frac{1}{2}=\frac{1}{4}$BC
	270	———	
	144	1	$10\frac{1}{2}$
	———	12	00=A.B
	1080	———	
	1080	12	00
	270	6	00=$\frac{1}{2}$AB
	——— Feet	4	00=$\frac{1}{3}$AB
	1728) 38880 (22.5	———	
	4320	22	00$\frac{1}{4}$
	874.0		
	110		

By *Gunter*, all Solids that are longer than broad, muſt be done at two Operations; as 1 is to 1 Foot 6 Inches, or a half, ſo is 1 $\frac{1}{4}$, or 1 Foot 3 Inches to 1 Foot 10 $\frac{1}{2}$. Then, as 1 is to 12 the Length, ſo is 1 Foot 10 $\frac{1}{2}$ to 22 the Content.

Thus, ſet 1 Foot in 1, and extend the other to 1 $\frac{1}{2}$, then ſet one Foot in 1 $\frac{1}{4}$, and the other Foot will reach 10 $\frac{1}{2}$, which is 1 Foot, and above $\frac{3}{4}$. Then alter your Compaſſes, by ſetting 1 Foot in 1, and extend the other to 12 on the Rule, then at that Extent, ſet one Foot of the Compaſſes in 1 Foot 10 Inches $\frac{1}{2}$, and the other will extend to 22, 3.

A CYLINDER.



A *Cylinder* is a Body of equal Diameters in all Parts, and may be either Solid, like the Rowling-ſtone of a Garden, or hollow like a Tub, for holding Liquor.

Let A.B the Diameter be 40 Inches, or 3 Foot 4 Inches, and B.D 66 Inches, or 5 Foot 6 Inches. Before you can find the *Area* of the End A.B, you muſt find the Circumference, by multiplying the Diameter into 3.14. Then half the Diameter, *viz*. 20, being multiply'd into $\frac{1}{2}$ the Circumference 62.8, produces 125.6 ſquare Inches, the *Area* of one End; multiply that *Area* by the Length B.C 66 Inches, and you have the Content of the *Cylinder* in ſolid Inches; Divide by 1728 for Feet of *Timber*, or 282, or 231 for Gallons of *Beer*, or *Wine*.

Example.

3.14
A.B = 40

Circumf. 125.60
$\frac{1}{2}$ Circumf. 62.8
$\frac{1}{2}$ Diam. 20

Area 125.6
66

7536
7536
Content
1728) 82896 (47.9 Feet
13736
1680.0
1158

Feet. Inch.
5 3 = $\frac{1}{2}$ Circumf.
1 8 = $\frac{1}{2}$ Diam.

4 3
2 $7\frac{1}{2}$ = $\frac{1}{2}$ of the $\frac{1}{2}$ Circumf.
$10\frac{1}{2}$ = $\frac{1}{6}$ of the $\frac{1}{2}$ Circumf.

8 9
5 6 = B.D the Length.

43 9
4 $5\frac{1}{2}$

48 $2\frac{1}{2}$ Feet.

By *Gunter*, as 1 is to $\frac{1}{2}$ the Circumference 5 Foot 3 Inches, or $\frac{1}{4}$, ſo is $\frac{1}{2}$ the Diameter, 1 Foot 8 Inches to 1 Foot $\frac{3}{4}$ the *Area* of the End A.B.

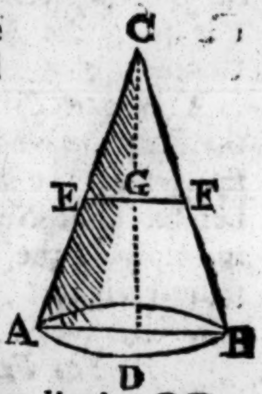
Then, as 1 is to the Length 5 $\frac{1}{2}$, ſo is the *Area* 8 $\frac{3}{4}$ to 48 the Content in Feet.

The foregoing Rule gives the Solid Capacity of the *Cylinder*, without any Deduction for *Slabs*; but if you allow for the *Slabs*, then you are to take the $\frac{1}{4}$ of the Circumference for the Side of the Square, which muſt be ſquared and multiply'd into the Length, and divided by 1728, or multiply in the Practically way, as you did in the *Parallelepipedon*.

A CONE.

A *Cone* is the ⅓ of a *Cylinder* of the ſame Height, and Diameter equal to the Baſe of the *Cone*.

Before you can meaſure a *Cone*, you muſt find the Perpendicular Height C.D, by ſubtracting the Square of the ½ Baſe B.D, from the Square of the ſlaint Height C.B, and the Remainder is the Square of C.D the Perpendicular; extract the Square Root, and you have the Perpendicular C.D.



Let A.B be 40 Inches, or 3 Foot 4 Inches; C.D 66 Inches, or 5 Foot 6 Inches. Find the *Area* of the Baſe, as you did in a *Cylinder*, and multiply by ⅓, the Height C.D, and divide by 1728 for *Timber*, 282 for *Beer*, 231 for *Wine*.

Example.

½ Circumf. 62.8
½ Diam. 20
———
1256
C.D = 66
———
Prod. 82896 Content
1728) ⅓ Prod. 27532 (15.9
10352
———
1712.0
1568

Foot. Inch.
5 3 = ½ Circumf.
1 8 = ½ Diameter
———
5 3
2 7½
10½
———
8 9
1 10 = ⅓ Height
———
8 9
4 4½
2 11
———
16 0½ Content.

By *Gunter*, as 1 is to the $\frac{1}{2}$ A.B, ſo is the $\frac{1}{2}$ A.B.D the Circumference, to the *Area* of the Baſe. Then as 1 is to $\frac{1}{3}$ the Altitude C.D, ſo is the *Area* to the Content.

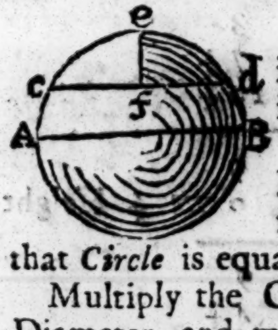
A Square *Pyramid*, or any other, let the Form of the Baſe be what it will, you muſt always multiply the *Area* of the Baſe by $\frac{1}{3}$ the Altitude, and divide as before. The Superficial *Area* of a *Cone* is found by multiplying the Circumference of the Baſe by $\frac{1}{2}$ the ſlaint Height.

The Fruſtum of a CONE.

E.F.A.B in the foregoing Figure, is the *Fruſtum*, or piece of a *Cone*.

Let E.F be 24 Inches, and A.B 36; add $\frac{1}{2}$ the Difference of the two Diameters to the leſſer Diameter, and that is the mean Diameter; multiply that by 3.14, and that gives a mean *Circle* to that Diameter; multiply half of that *Circle* by half the Diameter, and the *Product* multiply by the Depth G.E, and divide by 1728, or 282, or 231, and you have the ſeveral Contents.

A GLOBE or SPHERE.



The Superficial *Area* of a Sphere, is equal to four times the *Area* of its greateſt Circumference.

If a *Circle* be deſcrib'd, whoſe Diameter is equal to twice the Diameter of the Sphere, the *Area* of that *Circle* is equal to the Surface of the Sphere.

Multiply the Circumference of the Sphere by the Diameter, and multiply the *Product* by $\frac{1}{6}$ the Diameter, and divide by 1728, for *Timber*, 282 for *Beer*, 231 for *Wine*.

Example.

3.14
B.B=30 Diam.

94.23 Circumf.
30 Diam.

2826.9 Product.

2826.9 Product.
5=$\frac{1}{8}$ the Diam.

1728) 14134. (8 *Foot*,
(310

To find the Content of the *Segment* c.d.e.f, multiply the Altitude e.f by 3, and the Product by the Square of e.f, and to the Product add the Cube of e.f, and multiply the Sum by .5235. *Example.*

Radius e.f=6
6

36
Tripl. Alt.=9

324
27 Cube of the Alt.

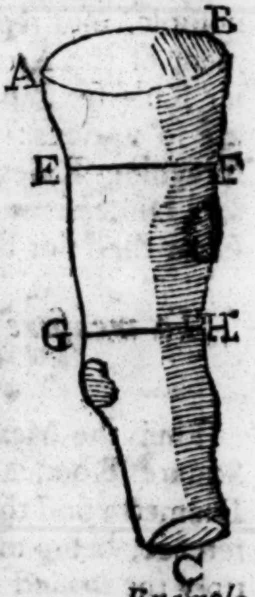
351 Sum.

351 Sum
.5235 Multiplicat.

1755
1053
702
1755

183.7485 Content.

To meaſure Timber *or* Stone.



Suppoſe A.B.C a Piece of *Timber* 28 Foot Long, and the Circumference at A.B, 24 Inches, at E.F 20 Inches, at GH 16 Inches; add thoſe three together, and the $\frac{1}{3}$ of the Sum is accounted the Mean Circumference, the $\frac{1}{4}$ of which, call the Mean Side of a Square: Multiply that by its ſelf, and multiply the Product by the Length, and divide by 1728, and the *Quotient* is the Content.

Example.

A.B.=24 5=Side of a Square
E.F.=20 5
G.H=16 ——
——Inch. Inch. 25
3) 60 (20 = 5 336 Length in Inches
——
1728) 8400 (4.8
1288.0
1056

Four Foot, and eight Tenths is the Solid Capacity, conſidering it as a Square Body, by cutting off the *Slabs*, for thoſe who buy *Timber*, meaſure it according the Square within, which they commonly deem to be $\frac{1}{4}$ the Girt. But if you deſign to have the true Content of it, the *Slabs* not being deducted, then you muſt meaſure it as the *Cylinder*, making the Mean Diameter, the Diameter of the *Cylinder*.

All irregular Bodies muſt be reduc'd, as near as poſſible, into regular Figures, according to the Judgment of the Artiſt; ſo that there can be no particular Rule ſet down, by reaſon the Figures of Bodies are ſo various: But he who has well digeſted the foregoing Rules, may eaſily form a Method to take the Dimenſions of any irregular Body, ſo that the Error ſhall not be great.

To meaſure a Spheroid, *or Solid* Oval *like an* Egg.

Find the Mean Diameter, by extraction of the Square Root, as directed in the *Oval*, then by that Diameter find the Circumference, and the $\frac{1}{2}$ Circumference, being multiply'd into $\frac{1}{2}$ the Diameter; multiply the *Product* by $\frac{2}{3}$, the longeſt Diameter, and you have the Solid Content.

To

To meaſure the middle Fruſtum *of a* Spheroid, *ſuch as a* Wine-Pipe.

To the double Square of the Bung Diameter, add the Square of the Head; multiply the Sum by the Casks Length, and divide by 1077, and the *Quotient* is the Number of Gallons of Beer the Cask will hold.

How to Meaſure moſt ſorts of Artificers Work, ſuch as Maſons, Bricklayers, Carpenters, Joiners, Plaiſterers, Glaziers, Painters *and* Paviers.

Artificers have different ways of Meaſuring, according to the Cuſtom of each Trade; ſome give the *Content* in Rods, others in Yards; ſome in Feet, others in Squares, and ſome in Running-Meaſure, that is, only Length without any Breadth, by a Line.

The only practical way is, after we have taken all the Dimenſions in Feet and Inches, we multiply ſo many Feet and Inches, by ſo many Feet and Inches, and that produces the *Content* in Feet and Inches, which we may reduce afterwards into Square Rods, Yards, *&c.* according to Pleaſure.

Let the Dimenſions be 24 Foot 10 Inches, by 8 Foot 9 Inches. *Example.*

Practically.			Decimally.		
24	10		12) 80 (6 Foot	24	76
8	9		(8 Inches	8	75
198	8			12380	
12	5	= ½ of 24 10		17332	
6	2½	= ¼ of 24 10		19828	
217	3½ Content.			216.65.00	

The manner of working the Vulgar Way, is this; Multiply 24 Foot 10 Inches, by 8 Foot 9 Inches croſs ways; thus 8 times 10 Inches is 80 Inches, divided by 12, is 6 Foot 8 Inches: Set down the 8 Inches, and carry the 6 Foot in Mind; then ſay, 8 times 4 is 32, and 6 I carry'd is 38: Set down the 8 under Feet, and carry 3, and 8 times 2 is 16, and 3 I carry'd is 19, which ſet down before the 8, and that makes 198 Foot 8 Inches: Now you have multiply'd the firſt Line into the Number of Feet in the ſecond Line, then as 9 Inches is the ¾ of a Foot, you muſt take the ½, and the ¼ of the firſt Line, and ſet them down in their proper Places, under what was ſet down before: or it is all one, to take the ½ of the firſt Line for the ½ Foot, and take the ½ of that ½ for the quarter Foot; make a Sum, and you have the Content 2173 ½. You muſt always conſider what *aliquot* Part or Parts, the Inches in the laſt Line is; take that *aliquot* Part of the firſt Line, and ſet down in order, Inches under Inches, and Feet under Feet, and let this be your general Rule in all Caſes.

Aliquot *Parts of a Foot, are as follows.*

Inches.
1 is 1/12
2 is ⅙
3 is ¼
4 is ⅓
5 is ⅓ and 1/12
6 is ½

Inches.
7 is ½ and 1/12 or ⅓ and ¼
8 is ½ and ⅙ or ⅔
9 is ¾
10 is ½ and ⅓
11 is ¾ and ⅙

To Meaſure Bricklayers *Work.* (Alingham.)

Brick-work is commonly meaſur'd by the Rod-Square, a Rod being 16 Foot and a ½, and a Rod-Square is produced by multiplying that Rod by it ſelf, which produces 272 ¼ Foot, the Content of a Rod-Square.

If a Wall be over, or under a Brick and a ½ thick, it muſt be reduced into that Thickneſs, by reducing all the Work that is meaſured, into ½ a Brick thick, and then turning it all into a Brick and ½, by the following Rule.

Suppoſe one Dimenſion to 56 Foot, by 24 Foot and 6 Inches, one Brick thick, another 18.6 by 6.9, two Bricks thick, and another 22.4 by 8.6, three Bricks thick. Set down the Dimenſions as follows, and multiply the Total of 1 Brick by 2, the Total of 2 Bricks by 4, and of 3 Bricks a by 6, and the Sum of all is the Total Square-Feet at ½ a Brick thick, which divide by 3, and it gives the Content in Feet 1 Brick thick, divide by 272, and it gives the Rods.

Example.

```
 56  0 = 1 B. thick     18   6 = 2 B.th.       22   4 = 3B. th
 24  6                   6   9                   8   6
 -------                -------                 -------
1344 0                 111   0                 178 · 8
  28 0                   9   3                  11   2
 -------                 4   7½                 -------
1372 0. Foot            -------                189  10 Foot
       2               124  10½ Foot                 6
 -------                     4                  -------
2744                    -------                1139
 499                   499   6
1139
 -------
4382  the Sum of  all the Totals.
3 ) 4382   (1460 Feet, 1 B. ½ thick.
    13                  272) 1460 (5.3 Rods 1 B. ½ thick
    18                       · 100.0
     02                        184
```

In meaſuring a *Chimney*, if it ſtand alone without leaning againſt any thing, girt it about below the Mantle, and take that for the Length, and the

Height of the Room for the Breadth, and multiply them together, gives the *Content*: But if it ſtand againſt a Wall, then you muſt meaſure it round to the Wall, and multiply that into the Height of the Room, aud that's the *Content*. Allow nothing for the Vacancy between the Hearth and Mantle-Tree.

For *Arches*, take the Breadth and half Breadth of the Arch, and add them together, multiply the Sum by the Length, for the Content in the Thickneſs of the Arch.

All kind of Ornamental Work, ſuch as *Cornice*, or *Frieze*, *&c.* are meaſur'd by Running-Meaſure.

Carpenter's Work, as *Flooring*, *Roofing*, &c. are meaſured by the Square, which contains 100 Square-Feet,

Maſon's Work, is meaſur'd by the Foot; if you meaſure the Workmanſhip of Stone-ſteps, then you muſt meaſure both Ends of the Steps, as well as the Length.

N. B. The method of Meaſuring *Timber*, by taking the mean Thickneſs by the *Callopers*, is very erroneous; for they make the Extent of the *Callopers* the ſide of the *Square*; which being ſquare, and multiply'd into the Length, will make its Content $\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{7}$ or $\frac{1}{8}$ (according to its irregular form) more than it truly is; and yet this is the Method of the Officers on the River *Thames*.

How

How to Gauge all manner of Brewing Veſſels without the Line of Inches, *or* Diviſion. *For the Square of the Diameter, is the Area in Gallons; and ſo are the Sides of Squares multiplied together without any more working.*

THE Law hath order'd, that a Beer Gallon ſhall contain 282 Cubical Inches, and a Wine Gallon 231; and thoſe two Numbers all Gaugers make uſe of for Diviſors; for they multiply the one ſide of a Square Cooler, or oblong into the other, (according to the true Rules of Menſuration) and divide by either of thoſe Numbers, having Regard to the Quality of the Liquor, and the Quotient gives the Area, in Gallons upon an Inch-deep.

Now to ſave the Trouble of a long Multiplication and Diviſion, which ſometimes occaſions Miſtakes; I have found out a way to Gauge any Veſſel in the tenth part of the time, without either of thoſe Numbers, or Inches. But by multiplying the Sides of Squares, or the Diameter of Rounds, *&c.* into themſelves, and the Product is the Number of Gallons and parts the Veſſel holds upon an Inch in depth; and it is ſo far from being diſputed, that I ſhall hereafter prove it to be juſt, by working ſome Queſtions both ways, and when compared they will be found equal; ſo that when the following Demonſtration is peruſed and duly conſidered, I doubt not but impartial Judges will give their Opinion, that it is not only the quickeſt, but the moſt correct way, by reaſon it is ſo little liable to Errors, which the other tedious way is very ſubject to.

Now 282 is the Superficial Area of a Square which holds a Gallon or an Inch in depth, therefore the ſide of that Square muſt be equal to the Root of 282, *viz.* 16.796. ſo that if any Rule be divided into Roots inſtead of Inches, and thoſe Roots number'd 1, 2, 3, *&c.* and ſubdivided into Decimal and Centeſimal Parts, that is ſurely a proper Inſtrument to Gauge by to find Areas, and to have no regard to Inches, otherways than to multiply that Area by Inches and Tenths to find the Content; for an Area is only the quantity at an Inch deep; therefore, the *Liquors* Depth muſt be multiply'd by Inches.

If the Root of 282 be ſuppoſed to be 16. 8, that is certainly the ſide of a Square, which being multiply'd by its ſelf, produces a Surface equal to the Superficial Area of a *Gallon*, which is nothing elſe but the Boundary of a *Gallon* in Length and Breadth, without any Thickneſs; but when this receives Thickneſs, by being an Inch, 2, 3, or 4 deep, then it is a ſolid Body, and contains ſo many *Gallons* and *Parts*, as it is *Inches* and *Parts* deep: which is ſo very plain, that it admits of no Demonſtration.

Since the *Root* 16.8 is the ſide of a Square which produces a Surface, which at an inch deep contains a *Gallon*; then the Side of a Square equal to twice that Root, muſt ſurely produce a Surface equal to 4 times that Quantity; for double Diameters produce quadruple Contents, or Area's. And ſo if you double the Side of a Square, the Content will be quadruple.

This being granted, it muſt neceſſarily follow, that as Roots are the Boundaries of ſeveral Quantities, thoſe Quantities may juſtly be meaſured by thoſe Boundaries, and the Roots may be term'd 1, 2, 3, 4, *&c.* and ſubdivided after the ſame manner as if they were Inches.

The *Gauge Point*, or 18.95, is call'd the Diameter of a Circle, which holds a *Gallon* on an Inch in Depth, or the Diameter of ſuch a Circle, whoſe Superficial Area is 282. If this be call'd the *Gauge Point* for *Circular Gauging* 16.8 may by the ſame Rule be call'd the Gauge Point for Squares, for it performs the ſame office.

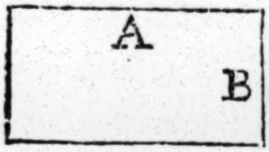
Now if I have divided my Rule into ſo many Gauge Points as the Rule will permit, inſtead of Inches; and number'd them, 1, 2, 3, &c. and I take my dimenſions therewith, and find the Diameter of a Tub to be 2 of thoſe Diviſions or Gauge Points; then ſince double Diameters gives four times the Content, double Gauge Points muſt do the ſame: Conſequently if you multiply two by two, it gives four Gallons on an Inch in depth, which is the ſame as if you had multiply'd 37.9 by its ſelf, and divided by 359, being the ſquare of the Gauge Point.

I invented this Rule when I was concern'd in the *Exciſe* at *Malton* in *Yorkſhire*, and found it to be of good uſe in the *Gauging* large Floors of Malt; for by this Rule after the Dimenſions were taken, I had nothing to do, but Multiply the length into the breadth, and I had the *Area* at once, without any Diviſion or large Multiplication. After that I *Gauged* a large Back in Mr. *Croſſe's* Brewhouſe in St. *Giles's*, Mr. *Everard* then Commiſſioner being preſent, who compared my *Area* with Mr. *Shepherd's*, and found it to be juſt, even to the 1000 part of a Gallon, and perform'd in the 10th part of the time which it would have taken up the common way. The Reaſon I now Publiſh it is to be of uſe to the Officers of Exciſe, who have large Buſineſs and many Malſters.

We'll ſuppoſe the Root of 282 to be 16 8 inſtead of 16.796. There is Placed on the ſide of the Rule e-

ver-againſt 16.8 Number 1. which is one Root, and oppoſite to 33.6 Number 2, which is two Roots, and oppoſite to 50.4, if ſo many Inches on the Rule, Number 3, and each of thoſe Numbers is divided into tenths and hundredth parts.

Suppoſe a Rule to be ſo divided, take the Dimenſions of any Back or Cooler therewith, as if they were Inches and Tenths, &c.



Let the ſide B, be 33.6, and the ſide A 50.4, Now the Rule being Divided as before directed, the ſide B will be 2, and the ſide A will be 3. We will work it both ways and ſee the difference, if there be any.

Example.

50.4=A
33 6=B

3024
1512
1512

282)1693.44(6.00 Area
144

A=3
B=2

6 Area

There are 33 Figures in one Operation, and but 3 in the other, which makes the difference in working as 10 to 1.

We ſhall ſuppoſe another to have Decimals by this new Rule. As the ſide A to be 2.1, equal to 35.3 on the line of Inches. And the ſide B to be 1.45 equal to 24.4 on the line of Inches: This we ſhall work both ways for another *Example.*

Example.

35.3=A
24.4=B

1412
1412
706
282)861.32(3.05
1532
122

A=2.1
B=1.45

3.045

The difference is here but $\frac{5}{1000}$ parts of a Gallon which is little more than the quantity of a thimble full.

Let the ſide A be 564.8 on the Line of Inches, which will be equal to 33.62 by the repeating the length of the Rule. And the ſide B 32.6 Inches, equal to 20.01 on the new Line.

A=564.8
B= 336

33888
16944
16944

282) 189772.8(672.9 Area
2057
832
2688
150

A=33.62
B=20.01

3362
6724

672.7362 Area.

Here you ſee that one of the largeſt Backs in London is not 2 tenths in 672 Gallons leſs.

Suppoſe you were to find the Area of a Cylinder, or any other Veſſel reduced into a Cylinder. You ſquare the Diameter and divide by 359, and the *Quot.* is the *Area* in Beer.

Now by this new Rule (becauſe 18.95 is the *Gauge Point*, or the Diameter of a Circle whoſe Area is 282) I make 18.95 Number 2 on the Rule, ſo that 37.9 will be Number 2, &c.

Let the Diameter of a Cylinder be 37.9 which will be equal to Number 2 on the Rule.

Diameter=37.9
37.9

3411
2653
1137

359(1436.41(4.00 Area
0041

Diam. 2 on the new Rule
2 =37.9 Inch.

4 Equal.

In all other Caſes of Circles it infallibly muſt anſwer.

I ſhall give one Example of Malt, and I think that will make it clear to any unprejudic'd Perſon, that the Rule is both exact and eaſie.

The Square Inches allow'd by Statute for a Buſhel is 2150, The Root of this Number is 46.36. which is the ſide of a ſquare that holds a Buſhel of Malt upon an Inch in depth, therefore that is made Number 1 on the Rule, which is Placed exactly oppoſite to 46.36 Inches, and that divided into Decimal and Centeſimal parts as before, performs the ſame work as the Line of Inches, and the ſet Diviſor 2150 doth.

Example, Take the length and breadth of a Floor of Malt by a Line or Tape, and you find the length to be 370.8, and the breadth 185.4, apply this Tape to your new divided Rule, and the length on the new Diviſions will be 8, and breadth 4. So that if you had taken the length and breadth of the Floor with any Line, without any regard to Inches, but applying the Line to theſe new Diviſions, you would have found breadth 4 and length 8. which being Multiplied, makes 32. equal to the *Area* of the Floor of Malt at once. But we ſhall work it by Inches, and ſee what difference there are.

Length=370.8
Breadth=185.4

14832
18540
29664
3708

2150) 68746.32 (31.97
4246
20963
15132
082

8=Length
4=Breadth

32 Area.

The Reaſon of this being .03 ſhort is becauſe I threw away ſome Decimals for brevity's ſake in working

The Rule and Tape with thoſe Diviſions are Sold only by Mr. *William Haddon*, Inſtrument-Maker, in *Gilt-ſpur-ſtreet* near *Newgate*, who has the Original Standard from my Projection, and none other but he.

FINIS.

Advertiſement.

ANY Perſon that hath Land to Survey, Timber to Meaſure, or Cellars of Wine or Beer to *Gauge*; the Author will perform it Juſtly, and at Reaſonable Rates. He is to be ſpoken with at *Henderſon*'s Coffee-Houſe in *Buckingham-Court* near the *Admiralty-Office*, every *Wedneſday* and *Friday*, at three in the Afternoon. He likewiſe Teacheth *Meaſuring*, *Gauging* and *Surveying*.

ERRATA

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